

Inhabiting the boulder-strewn or sandy, but low and marshy shores at points along Ombabika and Orient bays, Lake Nipigon, Ont. The type is our No. 6,944, from the marsh at the head of Ombabika Bay, north end of Lake Nipigon, Ontario, O. E. & G. K. Jennings, Aug. 15, 1914; other collections are 6,633 and 6,636, O. E. & G. K. Jennings, Aug. 6, 1914, and No. 7,001, O. E. & G. K. Jennings, north shore of Ombabika Bay, Aug. 16, 1914. Specimens in Carnegie Museum Herbarium.

ICHTHYOLOGY.—*The fish fauna of the Cordillera of Bogota.*¹

CARL H. EIGENMANN.

The Cordillera de Bogota (or Oriental of Colombia) extends from the equator northeastward to about the seventh degree of north latitude. It is continued northward as the Sierra de Perija to the Sierra Nevada de Santa Marta and northeastward as the Cordillera de Merida to Barquisimeta. The Maracaibo basin lies between the Cordilleras de Perija and Merida. It rises to a height of over 10,000 feet and forms an effective barrier to the intermigration of lowland forms for its entire length from near the equator to the Cordilleras of Perija and Merida. The Cordillera of Perija is the chief barrier between the Maracaibo basin and the Magdalena and the Cordillera of Merida between the Maracaibo and the Orinoco. It contains a series of highland plateaus or parks, of which the Plain of Bogota near its center, with an elevation of about 9,000 feet, is the best known. Its fresh-water fish fauna consists mostly of various species of *Astroblepus* and *Pygidium*, three species of *Pseudancistrus*, a *Chaetostomus*, and two species of *Hemibrycon*, all of which are mountain genera, the latter most frequently dipping into the lowland. Two genera, *Grundulus* and *Eremophilus*, are peculiar to the highland plateaus. Very few lowland genera and species ascend some distance on the slopes of these Cordilleras. *Farlowella acus* causes some surprise on the eastern slope at 4,500 feet. It is usually found much lower. *Creagrutus magdalena* and *Argopleura* cause greater surprise at Alban, at over 7,000 feet. These genera are usually found in much lower altitudes. The greatest surprise is furnished by *Creagrutus beni* at San Gil.

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It belongs to the eastern slopes of the Andes from the Rio Beni to Central Colombia at least. San Gil at 3628 feet in the Magdalena basin is its only record west of the Cordilleras. No lowland genera or species are found on the heights. So many of the lowland genera and species of the Magdalena to the west of it are identical with those of the Orinoco to the east of it, that it seems very probable that the formation of these young Cordilleras has cut a former continuous fauna in two. Is it possible that the presence of *Creagrutus beni* at San Gil indicates a late route of migration?

Our knowledge of the fauna of the Cordillera de Bogota is based on:

1. The observations of Humboldt during a stay at Bogota.
2. Collections received by the British Museum from different collectors.
3. Collections made by Mr. Manuel Gonzales, my servant during my ichthyological reconnaissance of Colombia in 1912. He collected for me in the Cordillera de Bogota within a radius of a few days riding from Bogota. He gathered specimens in the quebradas along the route from Facatativa on the Plain of Bogota northwestward to Honda on the Magdalena, the western base of the Cordillera. Also along the route northward from Bogota, from Suescum north through Susa, Chiquinquirá, Quebrada, Roperó, Guadalupe, Mogotes, San Gil, and Capitanejo in the territory embraced by the Rio Sagomoso and the Rio Suarez and finally southeastward from Bogota along the route from Bogota to Villavicencio.²
4. Very valuable collections made for Hermano Apolinar Maria, Director of the Museum of the Instituto de la Salle, on the Plains of Bogota and at the eastern base of the Cordillera of Bogota, at Cumaral and Carneceria. I have received a series of these fishes. Most of the species at Villavicencio, Cumaral and Carneceria more properly belong to the fauna of the Llanos of Colombia and Venezuela than to that of the Cordilleras.
5. Extensive collections were made by myself near Bogota.

² Mr. Gonzales also collected at Barrigon on the Meta but this locality is beyond the mountains. Other collections made by Gonzales were unfortunately lost by the carriers after reaching New York.

I. LIST OF ALL SPECIES RECORDED FROM THE CORDILLERA DE
BOGOTA

ASTROBLEPIDAE

A family of catfishes of one genus, found exclusively in the Cordilleras from southern Panama and Merida south to Lake Titicaca, from the highest elevation down in places to 300 feet. It has not been recorded from the Plain of Bogota but in all directions from it. The species have a large sucker mouth and a peculiar adaptation to take in water at the dorsal end of the gill slit to pass it out below while they hold fast to rocks with their mouths. The ventrals are freely movable backward and forward, enabling them to hunch forward. They are able to climb vertical and even overhanging walls.

Astroblepus Humboldt.

A. unifasciatus Eigenmann. North and west of Bogota, up to 7,258 feet; also on the Pacific slope in the Rio Dagua.

A. santanderensis E. North of Bogota up to 5,600 feet. Santander.

A. frenatus E. Known from a single specimen. North of Bogota, 6,534 feet. Santander.

A. micrescens E. Principally north of Bogota, sparingly west and east of it. 8,471 feet. It is the principal species of Santander.

A. chotae (Regan). North and west of Bogota. 7,400 feet. South to Ecuador.

A. longifilis (Steindachner). North and south of Bogota. Abundant from Peru to Panama.

A. homodon (Regan). West of Bogota. 7,258 feet. It is the characteristic species between Facatativa and Honda.

A. grivalvii Humboldt. Sparingly west of Bogota. Widely distributed in southern Colombia and Ecuador. The present identification may be questioned.

A. latidens E. Characteristic of the eastern slope east of Bogota between 1,500 and 5,300 feet.

PYGIDIIDAE

A family of South American catfishes with about a hundred species of very divergent habits.

Pygidium Meyen.

Found in all mountain streams of South America from the highest elevations to sea level. Short eel shaped. Bunches of erectile spines on its opercles enable it to maintain itself in the swiftest currents or to hunch itself forward between rocks or to burrow in sand, gravel, or mud.

- P. bogotense* E. Plains of Bogota to the Santa Marta mountains.
P. venulosum Steindachner. Paramo de Cruz Verde at the eastern edge of the Plain of Bogota. 10,000 feet.
P. stellatum E. Western slope of the Cordillera de Bogota.
P. striatum Meek and Hildebrand. North and west of Bogota. Southern Panama and Rio Dagua on the Pacific slope of Colombia.
P. stramineum E. North of Bogota. Santander.
P. nigromaculatum (Boulenger). North of Bogota, to Santa Marta.
P. vanneai E. Near Honda, west of Bogota.
P. latistriatum E. North of Bogota. Santander.
P. dorsostriatum E. East of Bogota at Villavicencio.

Eremophilus Humboldt.

E. mutisii H. "El Capitan," the only food fish of the plain of Bogota. The genus and species is all but confined to the plain of Bogota. It differs from *Pygidium* in having no ventral fins. It burrows in the banks and bottom in ponds and rivers.

LORICARIIDAE

A South American family of armored catfishes, principally of the lowlands, a few species ascending to 7,000 feet or more.

Pseudancistrus Bleeker.

Snout granular, with a large sucker mouth and bundles of spines on the interoperculum, both adjustments to torrential conditions.

Ps. setosus (Boulenger). North and west of Bogota up to 7,400 feet. On western slopes only.

Ps. daguae E. East of Bogota and in the extreme west of Colombia. Both slopes of the Andes.

Ps. pediculatus E. East of Bogota. Eastern slopes.

Chaetostomus Tschudi.

Snout naked. A large sucker mouth and interopercular bristles.

Chaetostomus thomsoni Regan. West and north of Bogota up to 7,258 feet.

Farlowella Eigenmann and Eigenmann.

Long slender fishes with no suggestion of adaptations to mountains.

F. acus (Kner). East of Bogota up to 4,500 feet.

CHARACIDAE

A very large family with the widest possible adaptations.

Hemibrycon Günther.

From sea level to 7,000 feet. No particular structural adaptation to high elevations.

H. colombianus E. North and west of Bogota, 4,620 feet. Santander.

H. tolimae E. North of Bogota and widely in the west of Colombia to 7,000 feet.

Creagrutus Günther.

In swift brooks, widely distributed.

C. magdalenae E. West of Bogota. Chiefly in swift lowland brooks.

C. beni E. East and north of Bogota, to 3,628 feet. On both slopes.

Argopleura Eigenmann.

Colombia west of the Cordillera de Bogota.

A. diquensis E. West of Bogota, lowland to 7,258 feet.

POECILIIDAE

Rivulus Poey.

Marine brackish and fresh water. South America to Buenos Aires.

R. magdalenae E. & H. West of Bogota, to 3,372 feet.

II. THE FISHES OF THE PLAIN OF BOGOTA

The Plains of Bogota are drained by the Rio Funza or Bogota which leaves the plateau by the Tequendama falls, 418 feet high. It empties into the Magdalena near Girardot.

The Plains of Bogota (locality No. 1), at about 9,000 feet elevation, harbor but few species. *Eremophilus mutisii*, "El Capitan," which has elsewhere been recorded only from Chiquinquirá, just north of the Plain; *Pygidium bogotense*, which is not distinguished by the local fishermen from the young of *E. mutisii*, extends north to the Santa Marta mountains; and *Grundulus bogotensis*, the "Guapuche" elsewhere taken only in the Quebrada Zuaita, wherever that may be. These three species were found in abundance everywhere I was able to fish.

"El Capitan" is found in the lakes as well as in the streams and the fishwomen in the markets point out lake forms from river forms. There was evidently considerable variation but whether this was correlated with localities I can't say. Three specimens were sent me recently, one of them white, one of them blind, and the third piebald. The specimens suggest that there is a white blind species which at times hybridizes with the normal form.

In addition to the three very common species Gonzales got *Hemibrycon tolimae* at Suescum at the extreme northern edge of the basin of the Rio Funza or Rio Bogota. Steindachner has recorded *Pygidium venulosum* from the Paramo de Cruz Verde at about 10,000 feet. This Paramo lies along the crest

southeast of Bogota. I do not know in which direction, east or west, the stream flows from which it was taken, and I am giving it the benefit of the doubt and am placing it in both lists.

III. THE DISTRIBUTION OF THE FISHES ALONG THE LINE BETWEEN THE RIO SECO NEAR HONDA AND THE PLAIN OF BOGOTA, NEAR FACATATIVA

Specimens were reported from the localities listed below. The longitude is from Bogota. The numbers refer to the species listed below.

1. Plains of Bogota. See Part II. 2. Sargento, 4,000 feet, 1, 2, 4, 5, 6, 8. 3. Guadual, Rio. 1, 2, 4, 5, 6, 8, 9. 4. Guaduas. Between 0° and $0^{\circ} 14' W.$, $5^{\circ} 7'$ and $6^{\circ} N.$, 3168 feet. 1, 2, 5, 6, 7, 12. 5. Guamal, 1, 2, 4, 5. 6. Villeta. $0^{\circ} 24' 30'' W.$, $4^{\circ} 56' 30'' N.$, 2,760 feet. 1, 8, 12. 7. Chimbe. Near Alban. 2, 4. 8. Alban, 7,258 feet. Formerly Aqua Larga. 1, 3, 4, 6, 8, 10, 11. 9. Chamisal. Exact locality not known. 4, 6, 9, 12. 10. Pacho. $0^{\circ} 5' W.$, $5^{\circ} 2' 25'' N.$, 5,893 feet.

The last named locality is not in line with the rest, being north-east of Alban. As far as I am able to locate the localities they run in the order given from Sargento to Alban. There are crests between Sargento and Guaduas and between Guaduas and Villeta. The entire territory drains into the Rio Negro and through it into the Magdalena.

SPECIES TAKEN BETWEEN HONDA AND FACATATIVA

The numbers following the names refer to the localities enumerated above.

1. *Astroblepus homodon*, 2, 3, 4, 5, 6, 8. 2. *A. unifasciatus*, 2, 3, 4, 5, 7. 3. *A. micrescens*, 8. 4. *A. chotae*, 2, 3, 4, 5, 7, 8, 9. 5. *Pygidium seelatum*, 2, 3, 4, 5. 6. *P. striatum*, 2, 3, 4, 6, 8, 9. 7. *Pseudancistrus setosus*, 4. 8. *Chaetostomus thomsoni*, 2, 3, 6, 8. 9. *Hemibrycon colombianus*, 3, 9. 10. *Creagrutus magdalenae*, 8.³ 11. *Argopleura diquensis*, 8.³ 12. *Rivulus magdalenae*, 4, 6, 9.

IV. THE FISHES OF THE HIGHLANDS OF SANTANDER

Most of the localities in this area, all of them draining into the Suarez and thence into the Rio Magdalena, are small quebradas not given on any maps available.

³ I have no reason to doubt these localities, especially as the two species were not taken elsewhere by Gonzales. But it is certainly remarkable that they should be found at Alban at over 7,000 feet and not between Alban and Honda.

The first eighteen, Nos. 11-28, are "Astroblepus brooks," probably very swift, from which *Astroblepus* can easily be caught from under rocks with a dip-net. In these brooks *Pygidium* has rarely been taken either because it is rare or absent, or because *Pygidium* is not so readily taken in such streams.

The next eight are preeminently "Pygidium brooks," possibly with pools that could be seined. *Pygidium* can readily be taken in pools in which *Astroblepus* would not be found.

Zuaita of this group is notable as containing *Grundulus*, otherwise only found in the Plain of Bogota.

The most interesting place is San Gil, containing *Crcagrutus beni*, otherwise not found west of the crest of the Cordillera of Bogota.

Localities and their location north of the Plain of Bogota,
mostly in the Province of Santander

The longitude is measured from Bogota. The numbers following the names of the localities refer to the list of species below.

11. Ducho, Rio, 1, 4, 5. 12. Labaja, Quebrada, 1. 13. Callejona, Q., 2. 14. Charala, Q., near Ocamonte, 2, 8. 15. Guadalupe, $0^{\circ} 20' 42''$ E., $6^{\circ} 2' 30''$ N., 5,400 feet, 2. 16. Guapota, $0^{\circ} 25' 10''$ E., $6^{\circ} 7' 45''$ N., 3,300 feet, 2, 5. 17. Mogotes, $6^{\circ} 16'$ N., $0^{\circ} 42' 42''$ E., 5,626 feet, 2, 6. 18. Pava, Q., 2, 5. 19. Pelada, Q., 2, 4, 5. 20. Varriri, Q., 2, 5. 21. Cabarachi, Q., 4. 22. San Joaquin. Near San Gil, 6,534 feet, 3, 4. 23. Densino, Q., 4. 7. 24. Potrero, Q., 4. 25. Siachia, Q., 4. 26. Susa, $0^{\circ} 4' 45''$ E., $5^{\circ} 54' 35''$ N., 8,471 feet, 4. 27. Arguello, Q., 5. 28. Baipe, Rio Boyaca, 7,400 feet, 5, 14. 29. Pinchote, $0^{\circ} 33' 45''$ E., $6^{\circ} 19' 25''$ N., 4,150 feet, 5, 11. 30. Ocamonte, $6^{\circ} 9' 45''$ N., $0^{\circ} 35' 35''$ E., 4,620 feet, 7, 19. 31. Honda, Q., 7, 10. 32. Mango, Q., 7. 33. Zuaita, Q., 7, 16. 34. Piedras, R., 8, 19. 35. Capitanejo, $6^{\circ} 18' 40''$ N., $1^{\circ} 0'$ E., 3,867 feet, 9. 36. Raya, Q., 9. 37. Hato.⁴ Between 0° and 1° E., and 4° and 5° N., 4,300 feet, 12. 38. Ropero, Q., about $5^{\circ} 43'$ N., 12, 15. 39. San Gil, 3,628 feet, 12, 14, 15, 16, 19. 40. Suescum, $5^{\circ} 2' 25''$ N., $0^{\circ} 11'$ E., 7,073 feet, 16, 18. 41. Chiquinquira, $1^{\circ} 56' 45''$ E., $5^{\circ} 32' 20''$ N., 8,626 feet.

It will be noted that only San Gil is credited with more than three species. 13 (*Eremophilus*) otherwise only in the Rio Funza basin.

⁴ There is another Hato near San Gil.

List of the species along the heights north of Bogota with their specific localities by number.

ASTROBLEPIDAE

1. *Astroblepus unifasciatus*, 11, 12. 2. *A. santanderensis*, 13, 14, 15, 16, 17, 18, 19, 20. 3. *A. frenatus*, 22. 4. *A. micrescens*, 11, 19, 21, 22, 23, 24, 25, 26. 5. *A. chotae*, 11, 16, 18, 19, 20, 27, 28, 29. 6. *A. longifilis*, 17.

PYGIDIIDAE

7. *Pygidium straminium*, 23, 30, 31, 32, 33. 8. *P. bogotense*, 14, 34. 9. *P. nigromaculatum*, 21, 35, 36. 10. *P. banneaui*, 31. 11. *P. latis-triatum*, 29. 12. *P. striatum*, 37, 38, 39. 13. *Eremophilus mutisii*, 41.

LORICARIIDAE

14. *Pseudancistrus setosus*, 28, 39. 15. *Chaetostomus thomsoni*, 38, 39.

CHARACIDAE

16. *Grundulus bogotensis*, 33, 40. 17. *Creagrutus beni*, 39. 18. *Hemibrycon tolimae*, 40. 19. *H. colombianus*, 30, 34, 39.

V. THE FISHES AND THEIR DISTRIBUTION ON THE EASTERN SLOPE BETWEEN CHOACHI AND VILLAVICENCIO

Localities and their location. The longitude is east from Bogota.

42. Paramo de Cruz Verde.⁵ 43. Choachi, 0° 9' 40" E., 4° 32' 55" N., 6,200 feet, 1. 44. Caqueza, 0° 7' 40" E., 4° 25' 15" N., 5,300 feet, 3, 4. 45. Fosca, 0° 9' 15" E., 4° 20' 35" N., 4,500 feet, 2, 3, 4, 7, 9. 46. Naranjito, 4. 47. Marcetita, 3 and 4. 48. Perdices, 4. 49. Chirajara, 4. 50. Susumuco, 4 and 8. 51. Piperel, 4. 52. Villavicencio, 0° 30' E., 2° 15' 10" N., 1496 feet, 2, 4, 6, 8, 9, 10. 53. Carneceria, 1, 3, 7. 54. Rio Rontador, 4, 10. 55. Tengavita, 4, 8.

The species with their specific localities on the eastern slope are:

1. *Astroblepus grixalvii*, 43, 53. 2. *A. micrescens*, 45, 52. 3. *A. longifilis*, 44, 45, 47, 53. 4. *A. latidens*, 44, 45, 46, 47, 48, 49, 50, 51, 52, 54, 55. 5. *Pygidium venulosum*, 42. 6. *P. dorsostriatum*, 52. 7. *Pseudancistrus daguae*, 45, 53. 8. *P. pediculatus*, 50, 52, 55. 9. *Farlowella acus*, 45, 52. 10. *Creagrutus beni*, 52, 54.

This list gives a glimpse of the fauna of the upper slopes of the eastern face of the Cordillera of Bogota.

Of the localities I have not been able to place the Rio Rontador. The fact that *Creagrutus beni* is found there, places it probably

⁵ As stated elsewhere, I am not sure whether this drains to the east or the west. It lies between Bogota and Chipaque on the road to Villavicencio.

near Villavicencio. Tengavita is more uncertain. The fact that it contains *Ps. pediculatus* probably places it near Susumuco and Villavicencio. I have taken Marcetita of the maps to be Marutiba as made out from the labels. Carneceria is a day's journey north of Villavicencio. Villavicencio is given as 150 kilometers from Bogota or about 90 miles. Choachi is directly east of Bogota at a distance of 30 kilometers or 18 miles. Caqueza is 24 miles southeast of Bogota. Fosca is south of Caqueza. The line between Choachi, Caqueza and Fosca is nearly meridional. Naranjito or Naranjal, Marcetita, Perdices, etc., follow each other in order on the trail from Quetame, which is a few miles east of Fosca to Villavicencio.

All of the localities are drained into the Rio Meta and through it into the Orinoco.

There are other species of *Pygidium* (*metae*, *kneri*), at Barrigon, at the head of navigation on the Meta and others probably occur in the localities listed.

Of the species taken, *Astrobelpus grixalvii*, *micrescens* and *longifilis*, *Pseudancistrus daguae* and *Creagrutus beni* also occur west of the crest.

A. grixalvii is found in streams of southern Colombia to northern Peru. *A. micrescens* in Santander. *A. longifilis* occurs all the way from Panama to Peru.

Pseudancistrus daguae is abundant in the Rio Dagua on the Pacific slope and *Creagrutus beni* is recorded in this paper from Santander.

The one species characterizing the slope is *Astroblepus latidens*, which is known only from this slope, and everywhere on the slope except at Carneceria.

I suspect that the recorded absence of *Pygidium* from the higher slopes of the eastern side is due to incomplete collecting.